

# STATUS OF THE BENGAL FLORICAN *HOUBAROPSIS BENGALENSIS* IN INDIA<sup>1</sup>

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(With ten text-figures)

The Bengal florican is perhaps the most endangered among the world's 22 species of bustards. It was once common in the *terai* of Uttar Pradesh, Bihar, the *duars* of Bengal and the Brahmaputra valley of Assam (Ali and Ripley 1969). Outside India, it was found in Nepal, Bangladesh and Kampuchea. It is possibly extinct in Bangladesh (Khan 1982) and there is no recent record from Kampuchea. In Nepal, it is found in some protected grasslands in Sukla Phanta, Royal Bardia, Chitwan and Kosi Barrage areas (Inskipp and Inskipp 1983, 1985). In India it survives in many disjunct pockets in Assam, West Bengal and Uttar Pradesh. It is doubtful whether any viable population is left in Bihar and, barring an exception, perhaps it is the same in West Bengal. Assam possibly has more than half of the world's population of the Bengal florican, but even there they are restricted to isolated pockets of protected areas (Fig. 1).

The Bengal florican seems to have been totally eliminated from non-protected or inadequately protected areas in its former range. Indiscriminate conversion of grasslands into agricultural settlements and overgrazing has brought this magnificent bustard closer to extinction. This paper describes the current status of the Bengal florican in India. The paper is based on surveys done between 1985 and 1989 under the Endangered Species Project of the BNHS.

## METHODOLOGY

Observations were made mainly during the early morning or late evening, when the floricans

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are most active. As our chief aim was to locate as many birds as possible, the potential grasslands were first intensively watched from a jeep or an elevated spot. Later, attempts were made to flush the floricans, either by 3-4 people walking equidistant to each other or by scanning grasslands from elephant back. The number of floricans seen, their sexes, activity, time, weather, condition of the habitat, and time spent in each area were noted in a proforma.

Florican posters were distributed among the forest officials, guards, herdsman and villagers, and inquiries were made from old hunters, naturalists and local elders in each area. Extensive notes on other wildlife seen, general condition of the forest and disturbances to the grasslands were maintained.

Important florican areas were visited during the peak breeding season, when territorial males were easily seen during their aerial display. As has been proved by our earlier studies, bustards are very territorial during the breeding season (see Ali and Rahmani 1982-84, Sankaran & Rahmani 1986, Manakadan and Rahmani 1986). Thus the location of a territory i.e. display site of a male, is the identification of an individual male florican. As hen floricans are not easy to locate and appear to wander between territories, generally only the males of an area were sighted. Although we saw fewer hens than cocks, the population estimate is based on the assumption that the sex ratio is equal in this species.

Some of the sanctuaries mentioned here are either new or have not been described in the scientific literature; therefore, whatever important data we could collect about such areas are included.

## HABITAT

According to Ali and Ripley (1969), the Ben

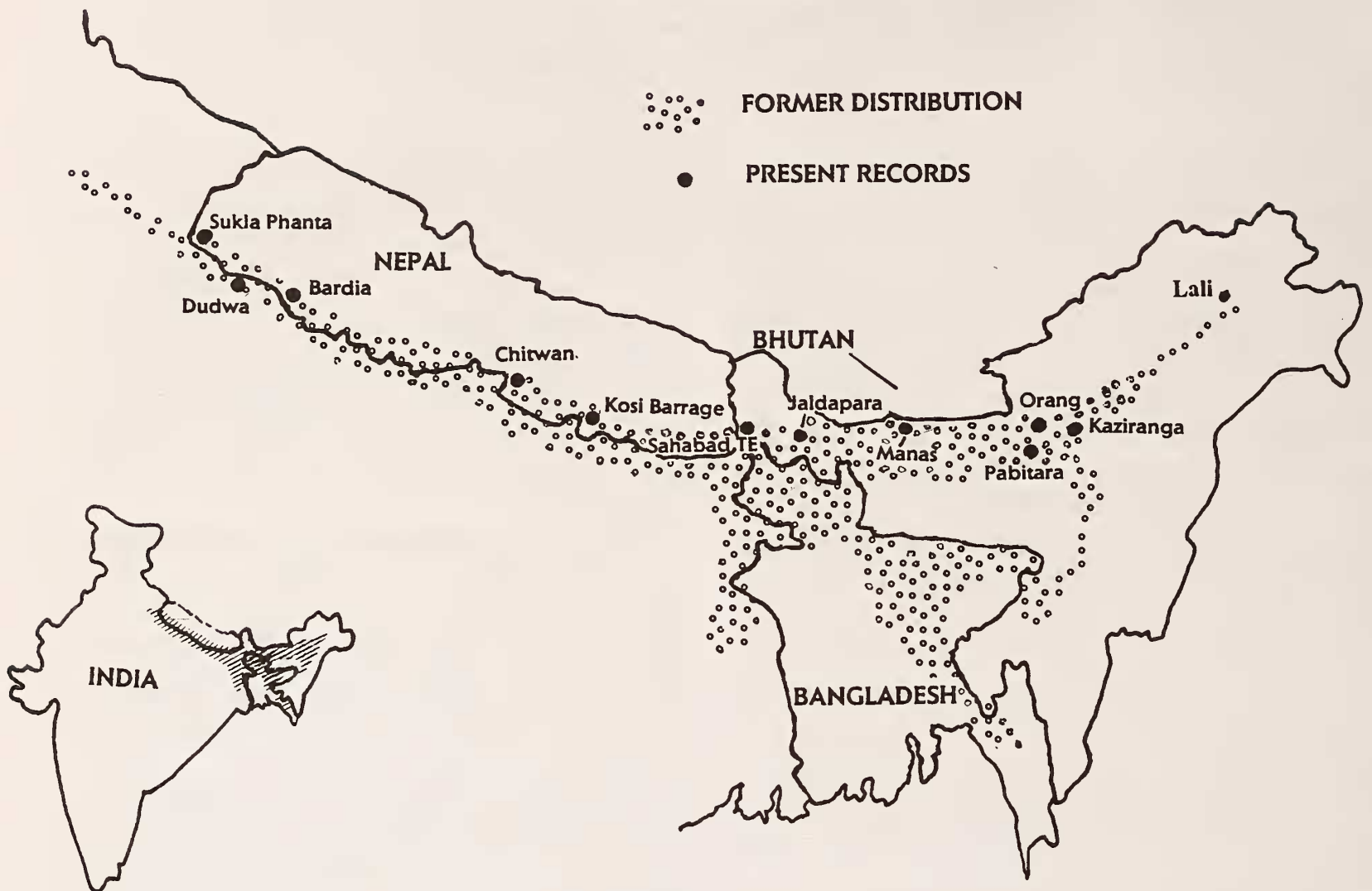


Fig. 1 Former distribution and present records of the Bengal florican in the Indian subcontinent.

gal florican lives in "tall grassland interspersed with scattered scrub and bushes, especially where grazed down to about half metre height or regenerating after the seasonal fire". Inskipp and Inskipp (1983) have also found them "almost entirely in pure grassland habitat". The dominant grasses in most florican habitats are *Imperata cylindrica*, *Narenga porphyrocoma*, *Setaria pumilla* and *Saccharum* and *Themeda* species (Table 1). Inskipp and Inskipp (1983) also found that *Imperata cylindrica* is the dominant grass species in 16 out of 20 sites studied by them. *Bombax ceiba* among the trees, *Cyperus* spp. among sedges, and *Grewia sapida* and *Sonchus* spp. among shrubs are dominant over other plants in most florican areas, especially in Assam. Omission

of a plant species in Table 1 does not necessarily mean the absence of that plant in a given florican area; because we visited many florican areas only briefly an in-depth analysis of plant species composition could not be made.

#### SURVEY RESULTS ASSAM

Till the early decades of this century, most of the alluvial grassy plains in the Brahmaputra valley in Assam, west of the present Sibsagar district up to the Himalayan foothills in the north, were good florican country. North of the Brahmaputra, the Biswanath plains, most of Darrang district and all the grasslands in the Assam *duars* including the present Kamrup, Nalbari, Barpeta and Kokraj-

TABLE 1  
COMMON PLANT SPECIES OF SOME FLORICAN HABITATS

Plant species	Manas	Orang	Pabitora	Kaziranga	Jaldapara	Dudwa
<b>Grasses</b>						
<i>Imperata cylindrica</i>	+	+	+	+	+	+
<i>Narenga porphyrocoma</i>	+	+	+	+	+	+
<i>Saccharum spontaneum</i>	+	+	+	+	+	+
<i>Vetiveria zizanioides</i>	+	+	+	+	+	+
<i>Setaria</i> spp.	+	+	+	+	+	+
<i>Desmostachya bipinnata</i>	+	+	+	+	+	+
<i>Themeda</i> spp.	+	+	+	+	+	+
<i>Cymbopogon</i> spp.	+	+		+	+	+
<i>Arundinella</i> spp.	+	+				
<i>Phragmites karka</i>	+	+	+	+	+	+
<i>Erianthus ravennae</i>	+	+	+	+	+	
<i>Arundo donax</i>	+	+	+	+	+	+
<b>Herbs and shrubs</b>						
<i>Cyperus</i> spp.	+	+	+	+	+	+
<i>Fimbristylis</i> spp.	+	+	+	+	+	+
<i>Grewia sapida</i>	+	+	+	+	+	+
<i>Sonchus</i> spp.	+	+				
<i>Leea crispa</i>	+	+		+	+	
<i>Blumea</i> spp.	+	+				
<i>Vernonia cinerea</i>	+	+	+	+	+	+
<i>Osbeckia rostrata</i>	+	+				
<i>Crotolaria</i> spp.	+	+		+	+	+
<i>Oxalis corniculata</i>	+	+			+	+
<i>Ageratum conyzoides</i>	+	+		+	+	
<i>Desmodium</i> spp.	+		+	+		
<i>Pygmaeopremna herbacea</i>	+					
<b>Trees</b>						
<i>Bombax ceiba</i>	+	+	+	+	+	+
<i>Dillenia pentagyna</i>	+	+		+	+	
<i>Gmelina arborea</i>	+	+	+	+	+	
<i>Embellica myrebelon</i>	+	+		+	+	
<i>Oroxylum indicum</i>	+	+		+	+	
<i>Careya arborea</i>	+	+				
<i>Shorea robusta</i>	+	+		+	+	+
<i>Acacia catechu</i>	+	+		+	+	+
<i>Dalbergia sissoo</i>	+	+			+	+
<i>Lagerstroemia parviflora</i>	+	+	+	+	+	+
<i>Terminalia</i> spp.	+	+	+	+	+	+

har districts had some of the best florican areas in the country. In the east, the Bengal florican was seen up to the foothills in Sadiya plains. It was less commonly found south of Brahmaputra river, from Goalpara to Dibrugarh, and was extremely rare anywhere south of Nagaon district. Even till the middle of this century the florican was not

uncommon in most of these areas.

Assam possibly has more than a third of the world's population of the Bengal florican. However, their viable populations are restricted only to the three better protected areas in the state—Manas, Orang and Kaziranga (Fig. 2).

The largest numbers survive in Manas Tiger

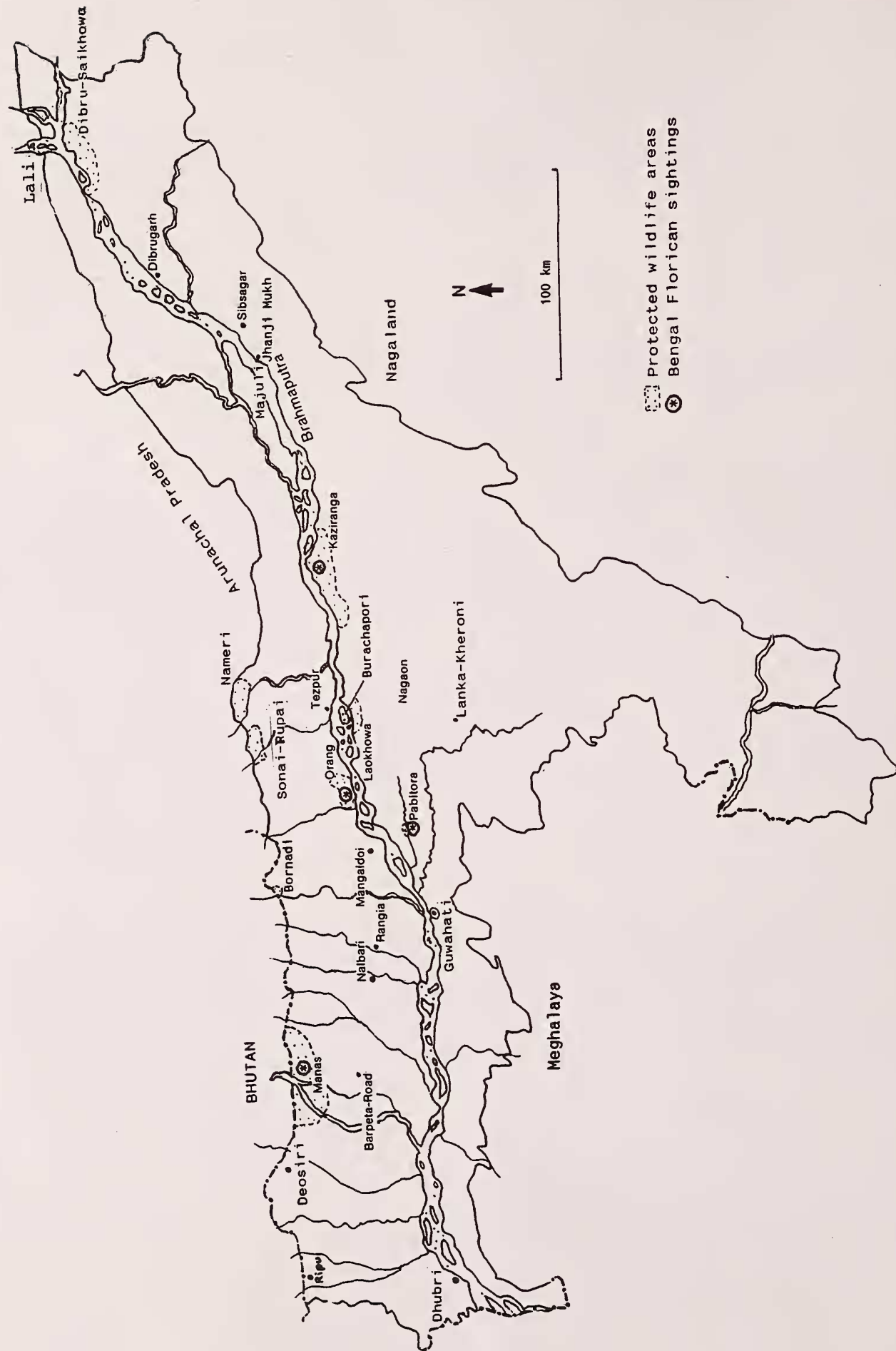


Fig. 2. Major sites in Assam surveyed for Bengal florican between 1985 and 1989.

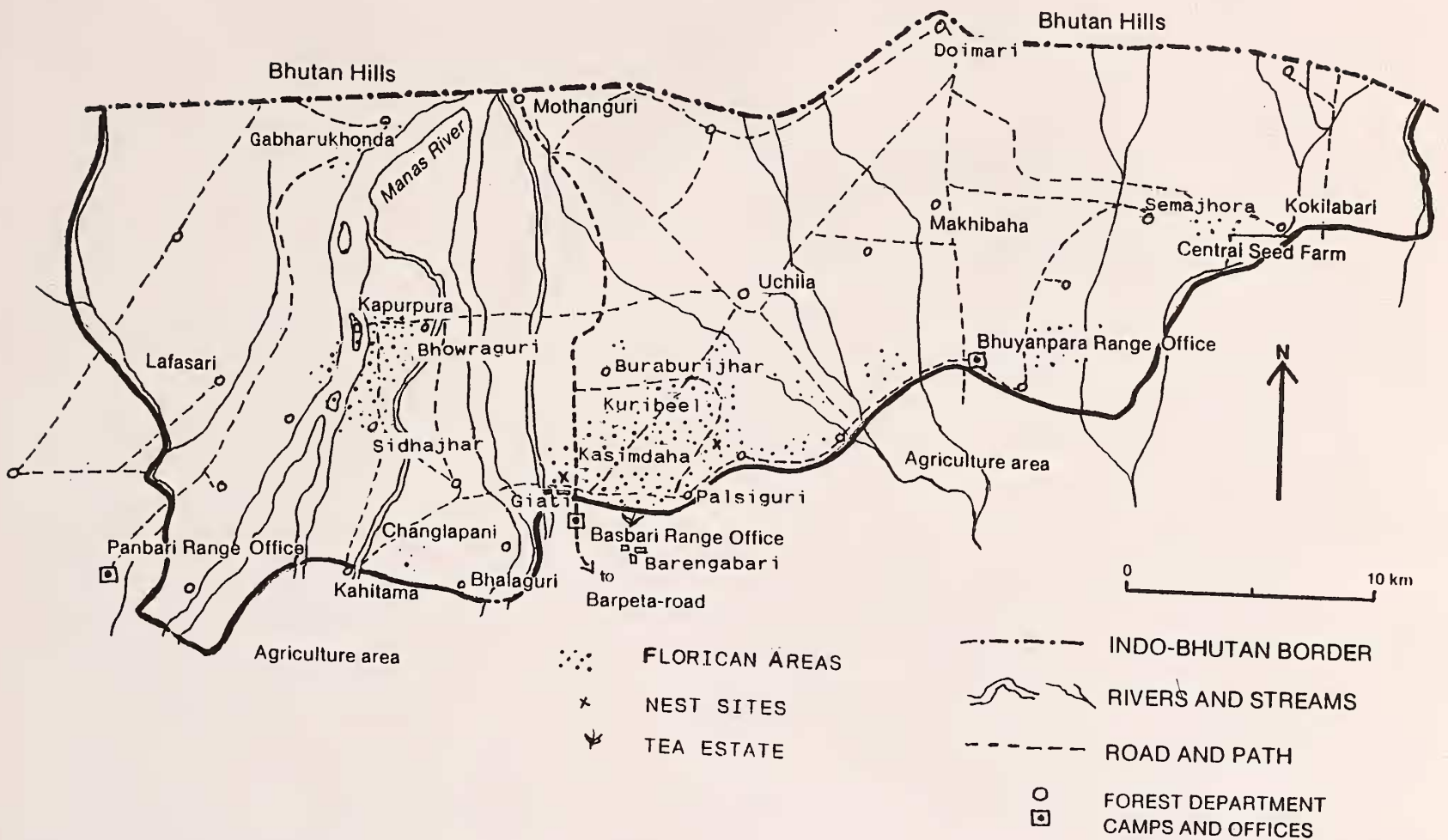


Fig. 3. Manas Wildlife Sanctuary

Reserve while Orang Wildlife Sanctuary is another very good habitat for the bird. Although Kaziranga National Park has some good grasslands, most of it is not suitable for florican, in spite of the Park being about six times as large as Orang. The number of floricans inhabiting the two places may be more or less the same. Pabitora Wildlife Sanctuary is the only other place in Assam where we saw the floricans in 1988, but none were seen in 1989 in this tiny sanctuary. The florican may still exist in very small numbers in a few more pockets but these populations are highly vulnerable.

MANAS WILDLIFE SANCTUARY

*District:* Barpeta, Kokrajhar, Nalbari.  
*Coordinates:* 90° 45' to 91° 25' and 26° 40' to 26° 50' N  
*Size:* 391 sq.km (Manas WLS is the core area for the 2837 sq. km Manas Tiger Reserve)

*Forest Types:* Moist mixed deciduous and tropical semi-evergreen forests; alluvial grasslands.

*Area under grassland:* About 60%

*Study period:* 3 to 7 May 1985; 3 to 10 Jan. and 17 Mar. to 4 June 1986; 18 Feb. to 2 Apr., 20 Apr. to 13 July 1987; 26 Jan. to 20 Apr., 2 May to 26 June, 4 to 12 July, 21 July to 5 Aug., 22 Aug. to 8 Sept., 12 to 31 Dec., 1988; 1 Jan. to 23 Feb., 10 to 19 Mar., 2 to 16 Apr., 10 to 30 May 1989.

*Grasslands surveyed:* Basbari Range: Kasimdaha and Mahout Camp fields near Giati and Barendgabri, Kuribeel, Palsiguri, Uchila, Buraburijhar, Latajhar, Bhowraguri, Sidhajhar, Kapurpura, Bhalaguri and Kahitama. Bhuyanpara Range: Katajhar, Bhatgeli, Dighaltari, Semajhora and Kokilabari. Panbari (Fig. 3).

**Habitat:** The florican habitat in Manas consists of extensive open (almost treeless) grasslands with comparatively shorter varieties of grasses and shrubs. These grasses rarely grow beyond 200 cm in height whereas in some other areas the grass

TABLE 2  
IDENTIFIED TERRITORIES OF MALE BENGAL FLORICANS AT MANAS WLS

Area	Location	Total no. of sites used as territories from 1987 to 1989	No. of territories in 1988	No. of territories in 1989
1. Kasimdaha	Between Basbari Range office, Pohu Field Saltlick and Pygmy Hog enclosure, west of main road	7	6	7
2. Mahout Camp Field	Area west of main road, north of Basbari (Giati) Mahout Camp	4	3	3
3. Palsiguri	West-northwest of Palsiguri camp near Barengabari, east of Basbari Uchila road	3	3	1
4. Uchila, Bongali Hathdhowa	Bhatgeli camps	1	1	?
5. Kuribeel	On both sides of Basbari-Uchila road, in area around watch tower	6	2	6
6. Buraburijhar	In the manually cleared saltlick patch	1	1	1
7. Sidhajhar and Kapurpura	a) Between Sidhajhar camp and Kapurpura camp along Manas river	6	6	5
	b) Sout-theast of the Kapurpura Bhowraguri road	2	2	1
Total		30	24	24

may grow up to 500 cm or more. The grasslands are maintained by annual burning in winter months and to some extent by inundation during the monsoon. Isolated or small clumps of trees, mostly silk cotton *Bombax ceiba*, are scattered sparsely all over the grassland. Regulated burning is carried out to prevent spread of these trees and also to clear the area of the previous year's dead stems and leaves. Grass harvesting is minimal.

**Results:** Between 1986 and 1989, at least 30 sites were identified as being used by male Bengal florican as breeding territories in the accessible study sites of the Basbari Range of Manas WLS (Table 2). All good florican habitat had short, moderately dense grass which was maintained by either controlled 'weté burning, grazing by wild herbivores or limited thatch collection without prolonged disturbance.

Although site fidelity is often shown by male floricans, they may not establish or successfully maintain territories in sites rendered unsuitable.

Causes for alteration of the habitat are usually improper or excessive burning, cutting or grazing of grass or even increased cattle and human disturbances. In these areas 24 territories were identified in 1988 and 1989, some of which were new sites or were being used after one season. All 30 territories were not counted in a single breeding season.

Additionally, a few floricans whose territories were not located and 2 to 3 immature males were seen in Basbari. Females were seen in all these areas and it is certain that their sex ratio is equal. It can therefore be estimated that at least 60 Bengal floricans are present in the Basbari range of the sanctuary.

Bengal floricans were also seen in the Semajhora-Kokilabari areas of the Bhuyanpara range in the sanctuary. Some other areas like Dighaltari and Digjari in this range appeared good for floricans. Floricans were also reported from Gabharukhonda and some other grasslands of

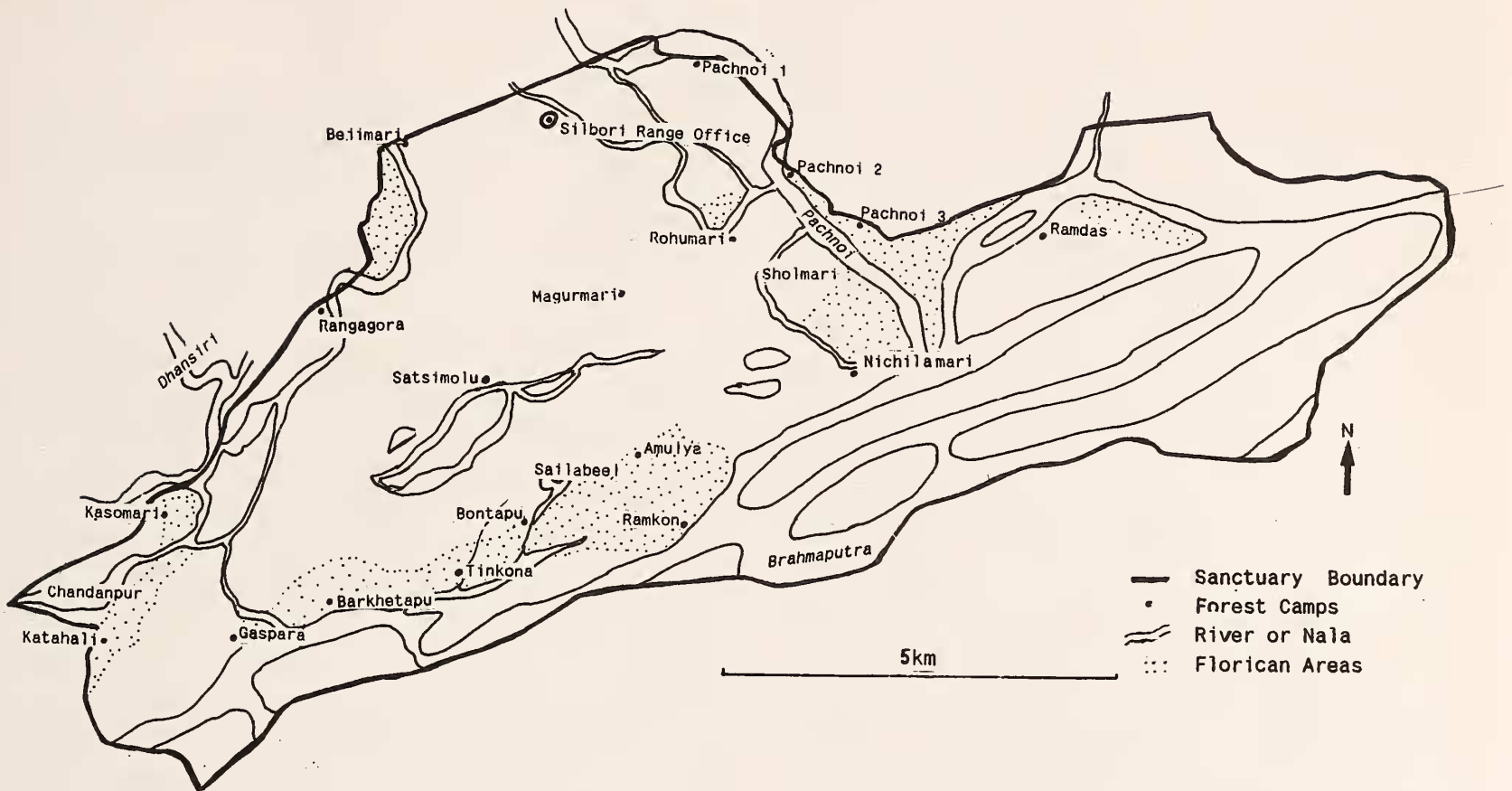


Fig. 4 Orang Wildlife Sanctuary.

Panbari range. The areas under both these ranges are disturbed due to the ongoing tribal agitation and status of florican there is uncertain.

A rough estimate would put the total florican numbers in the Wildlife Sanctuary at least 80 birds. It appears that floricans do not exist in areas outside the protected areas of the Sanctuary.

#### ORANG WILDLIFE SANCTUARY

**Location:** 26° 35' to 26° 40'N and 92° 15' to 92° 25' Darrang and Sonitpur districts.

**Size:** 70 sq. km.

**Forest Types:** Alluvial grassland, planted deciduous forest and swampy area.

**Dates of visits:** 7 to 9 May 1985; 22 to 23 April, 1, 2 and 19 July, 1988; 24 to 26 March and 4 to 7 May 1989.

**Grasslands surveyed:** Satsimolu, Amulya, Ramkon, Sailabeel, Bontapu, Tinkona, Kasomari, Gaspara, Katahali, Chandanpur, Barkhetapu, Rangagora, Bejimari, Magurmari, Rohumari, Sholmari, Nichilamari, Pachnoi and Ramdas.

**Habitat:** Orang (Fig. 4) is situated on the northern bank of the alluvial flood plains of the Brah-

maputra. The Dhansiri river, a tributary of the Brahmaputra, flows along its western boundary while another tributary, the Pachnoi, passes through its eastern part. Two distinct alluvial terraces, the lower Orang of more recent origin along the Brahmaputra and the older upper Orang to its north, are separated by a high bank traversing the sanctuary from east to west.

Orang was earlier a pure alluvial grassland. In 1915 it was declared a game reserve. In 1932, plantation of fast growing local species such as *Acanthocephalus kadamba*, *Albizia procera*, *Lagerstroemia flosreginae* was started, and some parts of the reserve were denotified to settle farmers from erstwhile Bengal under the grow-more-food programme. Intensive plantation was started in 1962. Along with the earlier planted local species, *Eucalyptus*, *Dalbergia sissoo*, *Acacia catechu*, *Tectona grandis*, *Artocarpus chalysha*, *Terminalia* spp., *Gmelina arborea* and *Bombax ceiba* were planted. In 1969, some

Professional Grazing Reserve (PGR) areas east of the river Pachnoi were included in the Game Reserve. Orang was managed under Project Tiger as an auxiliary reserve area from 1972 to September 1985, when it was upgraded from a game reserve to a wildlife sanctuary. Mainly established to save the highly endangered great Indian one-horned rhinoceros *Rhinoceros unicornis*, numbering about 65, only some of its grasslands are suitable for the florican.

**Results:** In May 1985, seven Bengal floricans were seen in a two day survey. In 1988, initial survey was carried out by five people in two groups on 22 and 23 April and altogether 13 floricans were seen, most of them in Lower Orang in the southern and south-western parts of the sanctuary. In 1989, 10 males and three females were sighted between 24 and 26 March, and additionally, five more floricans were reported from different areas by Forest Department staff. We saw nine floricans between 4 and 7 May 1989.

The extensive thatch fields around Amulya, Ramkon and Sailabeel harboured at least six males. A female with two chicks was seen here on 1 July 1988. Floricans were also seen in Katahalli, Kasomari, Barkhetapu, Tinkona, and Bontapu areas of lower Orang and Rohumari in upper Orang. The recent inclusions to the sanctuary with vast stretches of short thatch grass in Nichilamari and Pachnoi areas are good florican habitats. Six floricans in May 1985 and four in May 1989 were seen there.

Floricans were also seen in the former PGR areas on the eastern side of Pachnoi river. The Range Forest Officer, B.N. Talukdar, reported the florican from Ramdas *chaponi* of Brahmaputra but this island could not be surveyed properly by us. The grasslands along Rangagora Pathar on the western boundary which is planned to be incorporated in the sanctuary are also suitable, and a male florican was seen near Bejimari in March 1989.

After Manas, Orang is the most important florican habitat in Assam, and we estimate that at least 30-40 birds may be present in this small sanctuary.

#### KAZIRANGA NATIONAL PARK

*Location:* 26° 30' to 26° 45' N, 93° 05' to 93° 40' E. Golaghat and Nagaon districts.

*Size:* About 400 sq. km.

*Forest Type:* Alluvial flood plains of the Brahmaputra river, eastern alluvial grasslands, low alluvial savanna woodlands, serial stages of moist mixed deciduous forests, tropical evergreen forests and waterbodies.

*Dates of visits:* 11-12 May, 1985: 26-28 April and 15-16 August, 1988: 2-7 March and 28-29 April 1989.

*Grasslands surveyed:* Mihimukh, Mihibeel, Kathpora, Arimora, Borbeel, Merbeel, Methunmari, Garematikhawa, Naste, Debeswary, Kartika, Hilekhunda, Soisala, Barnalani, Defolumukh, Bhawani, Baguri Borbeel, Dongabeel (Fig. 5).

**Habitat:** Famous for the one-horned rhinoceros, Kaziranga lies in the alluvial flood plains south of river Brahmaputra and extends to the foot of the Mikir hills. The total area of the park fluctuates around 400 sq. km due to the vagaries of the Brahmaputra. About 52% of the Park is grassland, about 6% wetlands and the rest is forested (Kushwaha and Madhavan Unni 1986). Most of the grasslands, however, consist of tall 'elephanté grass unsuitable for floricans.

**Results:** Three male floricans were seen at Mihimukh, Arimora and Methunmari areas of Kaziranga during our visit in 1985, when many other areas of the Park had become inaccessible due to floods. In 1988 too, we could not visit many good florican areas for the same reason. The only floricans seen by us were two males in the Mihimukh grazing ground near the entrance of the park. A hen florican was seen in the same area by the mahouts of the Forest Department, and in 1987 a nest was found by one of them. A male florican has been seen near Mihimukh for the last 13 years (R.N. Sonowal, pers. comm.).

The park was surveyed properly in the first week of March 1989 when almost all florican areas suggested by park authorities and a few other areas including the islands in the Brahmaputra were visited. In spite of the wide ranging survey we could spot only five male floricans at Mihimukh, Methunmari areas and Naste and Bhawani *chaponies* (islands). Another island, Boralimora, which harboured floricans got washed away by the severe floods in 1988 (R.N.



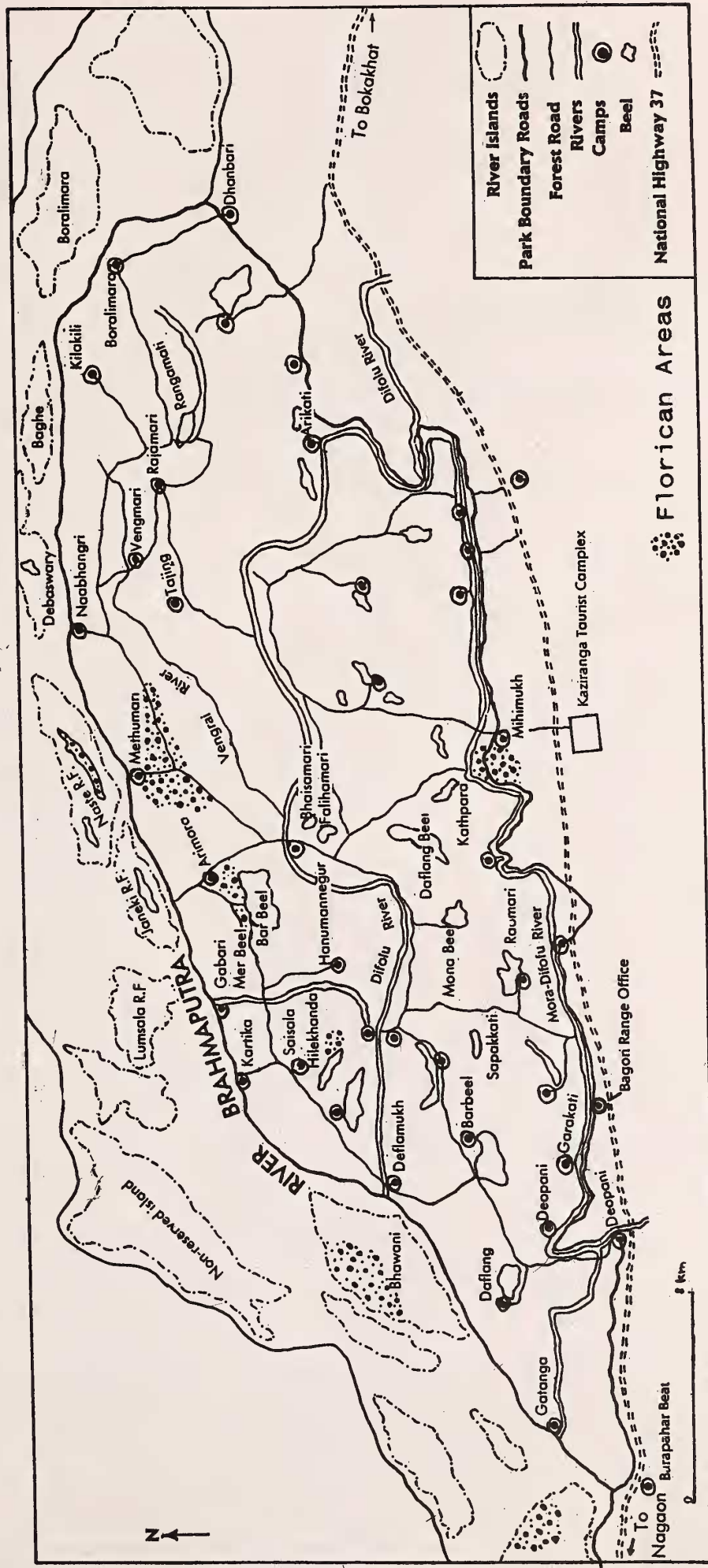


Fig. 5. Kaziranga National Park.

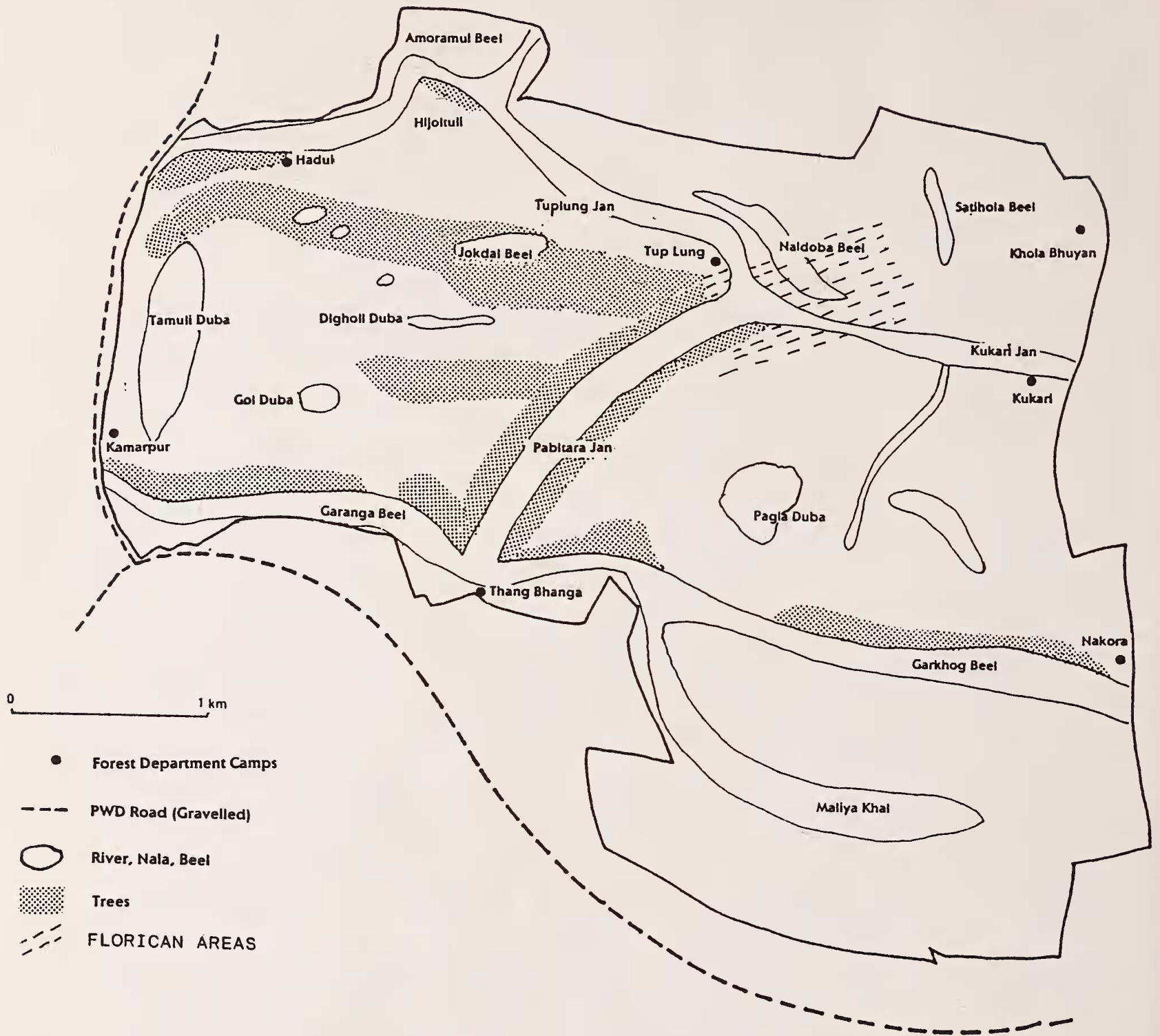


Fig. 6. The 16 sq. km area presently under Pabitora Wildlife Sanctuary where Bengal floricans were sighted for the first time during this survey.

Sonowal, pers. comm.)

In fact the changing vegetation pattern of the park due to recurring floods and prolonged water-logging may be one of major reasons for disappearance of florican habitats in Kaziranga, as many thatch areas are transforming into either tall grass or sandy areas. In 1988, 15 floricans were seen during the breeding season in Arimora,

Hilekhunda, Methunmari and Merbeel areas and on 10 April 1988, a nest with two eggs was found among short grass at Methunmari (D. Boro, pers. comm.). In 1989, we found that Hilekhunda and Merbeel do not have any good florican areas left. Forest Department staff confirmed that taller grass have appeared in the places where floricans used to be seen earlier. Areas around Methunmari

including *Naste chapori* are still the best florican habitats of the park. Some of the islands such as Debeswary and Lumasala were either very sandy or had vegetation not suitable for florican. Some areas in the western most part of the park are also good and two male floricans were seen around Laharni in March 1989 (Parag Muley, pers. comm.). Altogether, there could be 25-30 floricans in Kaziranga.

#### PABITORA WILDLIFE SANCTUARY

*Location:* 26°15'N & 92° E. Nagaon district.

*Size:* 16 sq. km.

*Forest Types:* Eastern alluvial grassland and flood plains.

*Dates of visits:* 15-16 May 1985, 30 April and 20 August 1988, 26-27 Feb., 21-22 March, 2-3 May 1989

*Grasslands surveyed:* Tuplung, Kukari and surroundings (Fig 6).

**Habitat:** Pabitora (Fig. 6) is more or less a grassland sanctuary, except for about 1 sq. km of forest and some waterbodies. The grassland is traversed by seasonal streams. Crop fields are present all around this tiny (16 sq. km) reserve. There are nearly 65 rhinoceros in the reserve, making it the most densely populated rhino area in India.

It was declared a wildlife sanctuary in 1987 and its area has provisionally been increased to 39 sq. km incorporating Raja Mayang Hill Reserve Forest and some other surrounding areas, much of which are under illegal occupation and cultivation.

**Results:** During our 1985 survey, we could not see any florican although we were told of occasional sightings in Pabitora. However, in 1988 we located three males and one female florican in Tuplung-Kukari areas. Two of these were territorial males with their territories within the cattle grazing zone. We were also told that two floricans were sold in the local market in April 1987. Unless adequate protection is given, the future of the florican in Pabitora does not appear very encouraging.

We saw no floricans during our three visits in 1989 and the habitat appeared a little degraded. We were told by the authorities that severe floods in 1988 had forced the destitute villagers to use

the grasslands for thatch collection and cattle grazing on a much larger scale than in earlier years.

#### BARNADI WILDLIFE SANCTUARY

*Location:* 26°50' N, 91°55' E. Darrang district.

*Size:* 26 sq. km.

*Forest Types:* High alluvial terrace in sub-Himalayan zone, highland savanna, eastern moist mixed deciduous forest and tropical semi-evergreen forests.

*Dates of visits:* 24 April and 29-30 June 1988.

*Grasslands surveyed:* Deosunga river bed and banks, and some former grasslands.

**Habitat:** Barnadi is situated at the foothills of the Bhutan Himalayas in Darrang district. In the west and south it is mostly surrounded by tea estates and in the east by agricultural fields for about 10 km, after which the Nonai Reserve Forests starts. On the northern boundary is Bhutan and on that side also there is a contiguous reserve forest.

Although about 60% of Barnadi sanctuary is reported to be grassland, most of it is now grassy woodland. Plantations of *Tectona grandis*, *Careya arborea*, *Artocarpus chaplasha*, *Dillenia* and *Anthocephalus* have destroyed the open grassland. The only open grassland in the sanctuary is along river Deosunga which is about 200 m at its broadest.

Barnadi forest was declared a wildlife sanctuary in 1981 mainly to protect the highly endangered pygmy hog *Sus salvinus* and hispid hare *Caprolagus hispidus*. Since these are mammals of open grassland it is puzzling why the tree plantations were continued even after 1981.

**Results:** The sanctuary was surveyed initially on 24 April and again on 29 June 1988. Many areas including Deosunga river bed were searched for floricans. During both visits, the river had very little water and the grassland appeared ideal for floricans. Although we could not see any floricans, we got reliable information from the forest guards that this bird occurs in Barnadi. A farmer from Rajagarh village which is close to the range office reported seeing a male and a female in a paddy field on 29 May. Two Forest Department employees saw solitary males in Nalanadi areas of the sanctuary in May (flying over) and in

mid-June. The Nalanadi area in the south-eastern corner of the sanctuary did not appear suitable and the floricans sighted there by the forest guard may have been temporary visitors.

At the time of writing the sanctuary was reported to be seriously disturbed by agitating Bodo tribals. Reports of burning of forest camps and subsequent desertion by protection staff have been received from there. We could not visit the sanctuary in 1989.

#### SONAI RUPAI RESERVE FOREST (Proposed Wildlife Sanctuary)

*Location:* 26°55'N, 92°30' E. Sonitpur district.

*Forest types:* Alluvial terrace in the eastern Himalayan foothills, tropical semi-evergreen moist deciduous forests and large open grassland patches in the plains.

*Size:* 175 sq. km.

*Date of visit:* 25 April 1988.

*Grasslands surveyed:* Gelgeli.

**Habitat:** The Sonai Rupai Reserve Forest contains tropical forests of *bhabar* type. Its northern boundary is contiguous with the excellent forest of Arunachal Pradesh. Plans are underway to declare it as a wildlife sanctuary. Presently, the forest is disturbed by human activities like hunting by tribals and army personnel and collection of minor forest products. The army also wants to convert some of the open areas into a firing range. **Results:** Nearly 200 ha in extent, the Gelgeli grassland in Sonai Rupai is one of the best grasslands of its kind and quite suitable for the floricans. The thatch grass was short and the vegetation compared well with other ideal floricane habitats which we have seen earlier in Manas, Orang and Kaziranga. However, an extensive search did not result in any floricane sighting. Inadequate protection and disturbance seem to be the reason for the scarcity of wildlife in this beautiful reserve.

#### NAMERI WILDLIFE SANCTUARY

*Location:* 27° N, 92°50' E. Sonitpur district.

*Size:* 138 sq. km.

*Forest Type:* Alluvial terrace in the eastern Himalayan foothills, tropical semi-evergreen moist deciduous forest with narrow strips of open grasslands along some rivers.

*Dates of visit:* 27-28 March 1989

*Grasslands surveyed:* Along Jia Bharali river including the islands near the place where its tributaries Upper Dekrai and Nameri meet into it.

**Habitat:** The habitat is similar to that of Sonai Rupai, with its excellent forests contiguous with those of Pakui WLS of Arunachal Pradesh. Open grasslands are restricted to the banks and *chapories* of the shallow, fast flowing Jia Bharali river.

**Results:** The surveyed grasslands, although not extensive, are suitable for floricans and it is possible for the bird to inhabit some of these areas. Some areas appeared overgrazed by cattle but relatively the sanctuary is much less disturbed than Sonai Rupai. We did not see floricans nor did the Forest Department staff report any. However, as effective protection is being provided only for the last 2-3 years, it is possible that the floricane may appear here in due course.

#### LAOKHOWA WILDLIFE SANCTUARY

*Location:* 26°30' N, 92°40' E. Nagaon district.

*Size:* 70 sq. km.

*Forest Types:* Alluvial flood plains of the Brahmaputra river. Seral stages of moist mixed deciduous forests, tropical semi-evergreen forests and aquatic areas.

*Dates of visit:* 13 May 1985, 29 April 1988, 28 Feb.- 1 March 1989.

*Grasslands surveyed:* Singhimari – 14th Mile, Sonaikusi, Borunguri, Laokhowa – Kathpora, Balukjan, Tekhala, Lathimari, Goldubi – Molamari, Rohumari, Kathalguri.

**Habitat:** Similar to Kaziranga in terrain and situated further downstream on the southern bank of the Brahmaputra, roughly 35% of Laokhowa is grassland, 30% under waterbodies and the remaining area under natural forest or plantation of *Bombax ceiba*, *Dalbergia sissoo* and *Albizia procera*. Marasuthi, a tributary of the Brahmaputra flows along the north-western part of the sanctuary.

There are eight forest villages — seven inside the sanctuary, and one just at the boundary, and several tribal settlements. In total, 10000-15000 people belonging to Bodo and Lalung tribes stay inside the sanctuary. Moreover, immigrant agriculturists from East Pakis-

tan/Bangladesh have settled all around the sanctuary.

Although Laokhowa was declared as a wildlife sanctuary in 1971 it was brought under Western Assam Wildlife Division only in June 1987. Commercial fishing and grass cutting rights have been suspended, but the sanctuary still provides fish, thatch grass, fodder and fuel to at least 15000 people, most of them from the eight tribal villages within the sanctuary. Additionally, hundreds of people and thousands of cattle from villages and buffaloes from *khutis* (camps) still come there every day.

**Results:** During our 1985 survey we found that Laokhowa was highly disturbed and there was hardly any chance of the florican surviving there. However, apparently the conditions had improved marginally after it was brought under the wildlife division and a male florican, probably a temporary visitor, was seen in February 1988 by Ishfaq Ahmed, ACF. We did not see any. There is no doubt that given adequate protection to the habitat, the florican will breed in the grasslands of the sanctuary, but a continuous monitoring of the habitat is necessary, especially when there is so much human pressure on this small sanctuary.

Our last survey showed that the grasslands of the sanctuary are still too disturbed for a shy bird like the Bengal florican. Laokhowa had over 60 rhinoceros before they were killed indiscriminately in the 1970s and finally eradicated during the political upheaval of the Assam agitation in the early '80s. Even now, the one or two rhinos arriving occasionally from other areas are not spared. The grasslands are presently not safe enough for the florican.

#### BURACHAPORI & KOCHMARA RESERVE FORESTS (Proposed Burachapori Wildlife Sanctuary)

*Location:* 26°35' N, 92°30' to 92°45' E. Sonitpur district.

*Size:* 65.5 sq. km (Burachapori 44 sq. km, Kochmara 21.5 sq. km)

*Forest type:* Alluvial flood plains of the river Brahmaputra.

*Dates of visit:* 1, 28 and 29 March 1989.

*Grasslands surveyed:* Dhania, Khulumukoli, Jhowbon, Basabari, Siali, Senimari and Kochmara.

**Habitat:** Burachapori and Kochmara are two islands along the southern bank of the Brahmaputra close to Laokhowa WLS. A narrow stream, the Laokhowa Suti, separates Burachapori from a part of Laokhowa. A few decades ago almost 90% of these islands were grass covered. Overgrazing by domestic buffaloes and cattle, human encroachment, tree plantation and lack of proper protection and management has substantially depleted the extensive grasslands of these fertile but flood prone islands. Still, about half the area of these islands is under grass. Some of the areas along the river shore are sandy and covered with *Tamarix*.

**Results:** Most of Kochmara and a part of Burachapori are encroached by immigrant agriculturists from erstwhile East Pakistan/Bangladesh. Their main crop is paddy. Even now grasslands are being converted into crop fields and we saw new areas being tilled by the encroachers.

Additionally, about 500 cattle and buffalo *khutis*, out of which over 350 are in Burachapori, are located within the proposed sanctuary. More than 20,000 cattle and buffaloes spread out in these islands and many cross over to Laokhowa WLS from these *khutis*.

Most of the existing grasslands are degraded or disturbed. Over 600 ha of open grasslands in Burachapori has been successfully planted with *Dalbergia sissoo*, making those areas unsuitable for floricans. Kochmara too has plantations but they are not successful and some Forest Department staff reported sighting a florican-like bird in the grassy patches inside plantation enclosures.

Although we did not see floricans, it is possible that a few still exist there as the area was perhaps one of the best florican habitats in Assam. However, unless the human pressure is reduced and proper protection is provided, there is no hope for the proposed wildlife sanctuary. The rhinoceros was exterminated from Laokhowa-Burachapori areas in the early the 1980s and since 1988 four rhinos arrived here, probably from Kaziranga or Orang. Out of these three have been killed and the fourth injured by poachers. There is therefore serious concern about the viability of these sanctuaries.

## MAJULI ISLAND

*Location:* 26°50' to 27° N, 93°50' to 94°30' E. Jorhat district.

*Forest type:* Alluvial flood plains of Brahmaputra.

*Dates of visit:* 24-26 April 1989.

**Habitat:** The world's largest river island, Majuli, is mainly under human habitation. The main stream of the Brahmaputra flows on its southern side; the vegetation of the island is similar to that of the northern bank of the river. Some areas on the island not connected to its inhabited parts appear as grasslands, while a few small islands adjacent to the main island are grass covered. The whole area is badly affected by floods in the rainy season.

**Results:** Being closer to the northern bank of the Brahmaputra, Majuli must have had Bengal florican habitats before cultivators took over. Floricans are still present on similar but uninhabited islands near Kaziranga, only about 40 km downstream. The Bishwanath plains on the north-western side of Majuli was once a good florican area. The open grasslands of Majuli were the first to be converted into cultivated fields, and now the remaining patches of grasslands are disturbed. The inhabitants of the island did not recognise the bird, except for a retired Forest Department employee from Kaziranga, who has been staying there for the last 12 years and reported sighting a male florican in 1987.

## OTHER AREAS IN ASSAM

In addition to the places mentioned so far several other areas in Assam were surveyed for floricans and their habitat. These included areas from where Bengal floricans were reported in good numbers even about 25 to 30 years ago. Deosiri (26° 45' N, 90° 50' E) and Ripu Reserve (approx. 26° 40' N, 90°E) in Kokrajhar district, many such places in Nalbari, Darrang, and Sonitpur districts were visited.

Places with occasional or rare sight records in Dhubri, Goalpara, Nagaon, Kamrup, and Jorhat districts including river islands near Jhanjimukh (26° 55' N, 94° 23' E) and areas east of river Kapili around Lanka (25° 55' N, 92°58'E) were also

surveyed (Fig. 2).

Dibru-Saikhowa Wildlife Sanctuary (27° 45' N, 95° 20' to 95° 35' E) located on the southern banks of Brahmaputra in Dibrugarh district, was visited but we could not survey the islands and riverbanks due to flood. Floricans were reported to be fairly common on the northern bank of the Brahmaputra in the area but they were scarce in the southern bank even in the last century (Hume and Marshall 1879). Suitable grasslands were not found in the approachable areas of the sanctuary.

Most of the former grasslands in the above areas have completely disappeared, and the few small ones that remain are no longer suitable for floricans.

## WEST BENGAL

The Bengal florican was found in West Bengal as far south as Nadia district and was common in North Bengal, Dinajpur and Malda district (Hume and Marshall 1879). Due to spread of cultivation they started disappearing rapidly in the first half this century itself. The last definite record from Nadia was in January 1884 (Baker 1912). By 1935 they had become rare in districts of West Bengal (Baker 1935) and by 1975, had vanished from Malda and West Dinajpur districts as well (Mukherjee 1981).

To know the current status of the Bengal florican in West Bengal, a brief survey was carried out in Malda, West Dinajpur, Darjeeling, Jalpaiguri and Cooch-Bihar districts of the state in 1985-86. The survey sites were selected on the basis of available information on former occurrence as well as recent sightings of the bird, and on additional information received during the course of the survey. Cooch-Bihar, Darjeeling and Jalpaiguri districts were again visited in April-May 1988 and June 1989 (Fig. 7).

Malda and West Dinajpur districts of central West Bengal are in the fertile Indo-Gangetic plains. Darjeeling, Jalpaiguri and Cooch-Bihar are in the *duars* of northern West Bengal which is an extension of *terai* and *bhabar* tracts between Nepal and Assam.

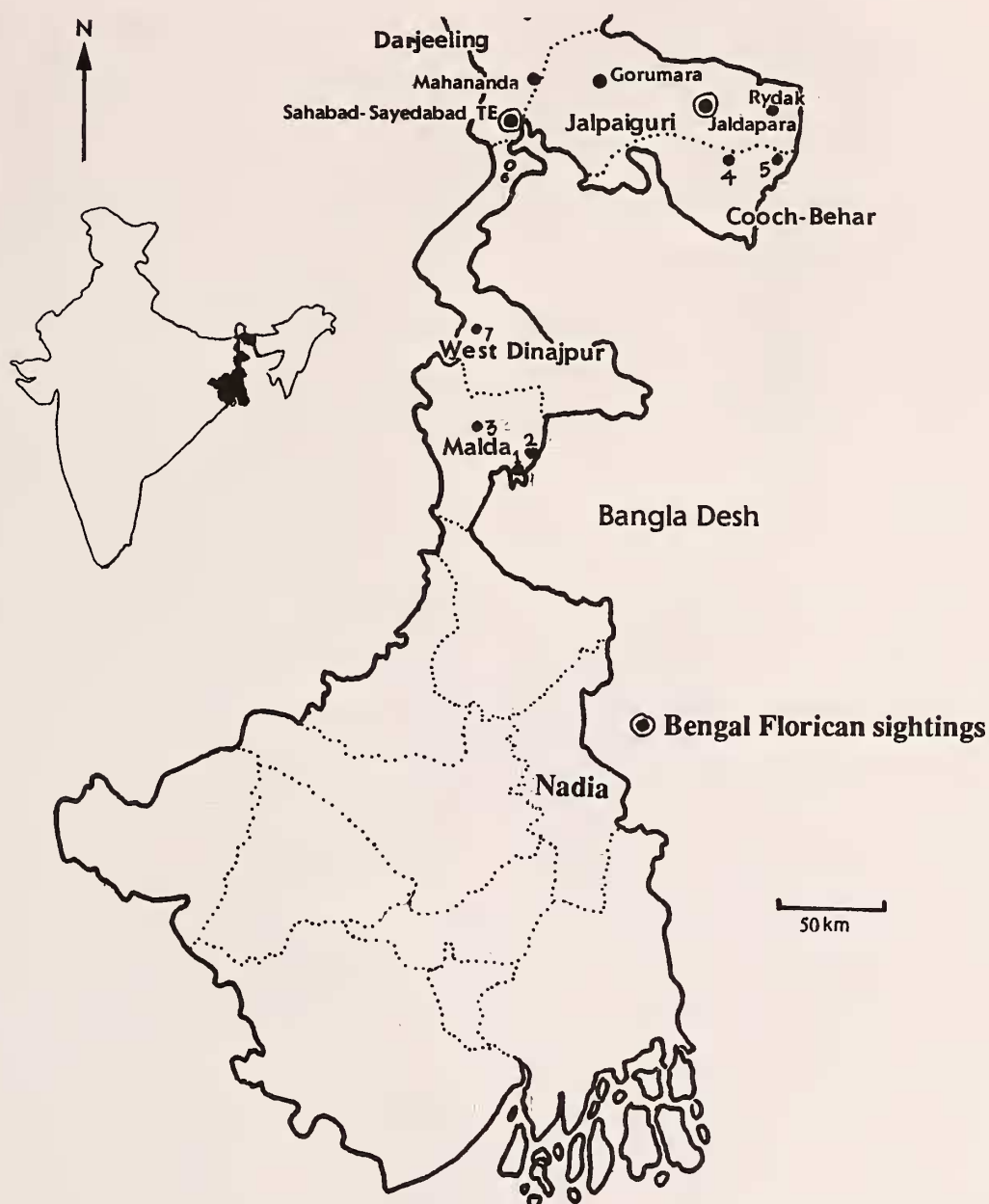


Fig. 7. Survey sites in West Bengal. 1. Singhabad-Tilason, 2. Harishchandrapur, 3. Bhaluka RF, 4. Sonapur, 5. Atiamachar, 6. Chopra, 7. Raiganj.

#### MALDA DISTRICT

#### SINGHABAD-TILASON, HARISHCHANDRAPUR AND BHALUKA RESERVE FOREST

**Location:** Singhabad—Tilason and Harishchandrapur ( $24^{\circ}55'N$ ,  $88^{\circ}20' E$ ) are on the Indo-Bangladesh border along the river Punarbhaba, and Bhaluka Reserve Forest ( $25^{\circ}15' N$ ,  $87^{\circ}55' E$ ) is about 40 km north-west of Malda town.

**Dates of visit:** 22 to 24 December 1985.

**Habitat:** Most of the areas around the first two sites are under cultivation. Small patches of grasslands exist along the river or around the so-called protected forest which seemed like a monoculture of *Barringtonia acutangula*.

Narrow strips or small patches of *Imperata* grassland were also present in the buffer zone of

these forest and on the revenue land leased to local landless people. The marshy grassland around the international border along the Punarbhaba river was too disturbed due to livestock grazing, marginal farmers and fishermen.

The Bhaluka Reserve Forest consisted of *Eucalyptus* and *Barringtonia* plantations with understory of grass. Patches of crop and thatch fields were also present in the forest. The villages near the forest had some small thatchfields but no suitable area for florican was found.

Most of these grasslands get flooded during the monsoon. The grasses, including those growing inside the protected forests, are auctioned and harvested around March.

**Results:** It is almost certain that floricans do not

exist in these areas. The grassland patches in the protected forests were too small and disturbed. The village thatch fields were still smaller.

Inquiries about the Bengal florican, locally called as *dahar* or *charas*, revealed almost total ignorance about this bird among local people. However, one villager near Bhaluka recognised the illustration of the bird and recalled having seen a few of these jumping birds in the grasslands after a major flood in the area some time in the mid-1970s.

#### WEST DINAJPUR DISTRICT

Suitable grasslands were not found in this district as the situations were similar to those in Malda district. Although this district was not surveyed extensively, enquiries made it clear that there may be hardly any suitable habitat left for floricans. At the time of writing we received news of the sighting of a Bengal florican in a tea-garden thatch field near Chopra in the extreme north of the district (S. K. Guha, pers. comm.). Mukherjee (1981) too had reported floricans from the flood plains of river Atrai in the area. The grassland pockets are so small and few, like those in Darjeeling district, that there is not much hope for the floricans in the area.

#### DARJEELING DISTRICT

The only suitable florican area in this district was found among the thatch fields of two tea-estates. Bengal floricans were eventually seen there during the second visit to the site.

#### SAHABAD-SAYEDABAD TEA-ESTATES

*Location:* 26°35' N, 88°20' E. On National Highway 31 about 10 km south of Bagdogra.

*Dates of visits:* 26 December 1985, 26–27 May 1986, 16 Feb. 1987, 3 June 1989.

**Habitat:** The area consists of relatively less disturbed thatch fields, and cultivations in an undulating land of about 30 ha between the tea plantations. In December about three-fourths, of this area was covered with 100 to 250 cm tall grass (mostly *Imperata*) and shrubs with a few

scattered simul (*Bombax ceiba*) trees. A stream passes through the area.

During the second visit in May 1986, the *Imperata* grass was short and even other grasses and shrubs were small (c. 50 cm). *Grewia sapida*, whose fruits are eaten by the florican, were flowering and beginning to fruit. The grasslands were disturbed to some extent due to livestock grazing.

**Results:** Workers and graziers recognised the florican from illustrations, but said that the birds are seen only after the harvesting of the thatch grass in March-April. It is locally called *Kher menjur* in Sadri by the workers from southern Bihar (*kher* = thatch, *menjur* = peafowl).

The area was visited again in May 1986 and two adult male floricans were sighted, of which one was displaying. No female was seen. It was rumoured that someone had poached florican eggs but no one could tell the location of the nest.

Some Forest Department officials of West Bengal reported seeing a male florican on the grassy banks of Balasan river not far from the tea estates (Sanyal 1988).

We did not see floricans during subsequent visits to the tea estates in February 1987 and June 1989 and the area was considerably disturbed by tea garden workers, their children and cattle. They were ignorant about its endangered status and some openly admitted to killing florican or robbing its nest, and agreed that sightings have become very rare.

The area is owned by the two tea estates and is used for growing thatch and paddy for workers. Thus the efforts to protect the grassland indirectly help the floricans. If proper protection is not provided through educating the people using the area, or if the proposal to bring the area under tea by the estates is not stopped, one of the two or three remaining habitats of the Bengal florican in West Bengal will be destroyed.

#### MAHANANDA WILDLIFE SANCTUARY

*Location:* 26° 50' N, 88° 30' E. In Darjeeling District.

*Date of visit:* 8 May 1988

*Forest Types:* Moist deciduous forest, east Himalayan upper *bhabar* sal, riparian grassland



**Habitat:** The whole sanctuary is more or less under thick forest. However, there are some riverine grasslands on the banks and islands of river Teesta.

**Results:** There is one grassland called Ghoramora which we could not visit due to floods. In the river Teesta, about a kilometre from Ghoramara, there are some big grass-covered islands which may have some floricans. We could not survey these islands due to early floods. It is possible a few floricans exist in these grasslands.

#### JALPAIGURI AND COOCH-BEHAR DISTRICTS

Jalpaiguri and Cooch-Bihar districts are contiguous with the alluvial plains of western Assam. The forests consist of *Shorea robusta* intermixed with moist deciduous trees. The forests are replaced by savanna woodland and grasslands in the flood plains along the rivers. It is in these grasslands that the floricans were expected most. During the survey we visited sites where good grasslands were reported.

#### JALDAPARA WILDLIFE SANCTUARY

**Locality:** 26°40' N, 89°20' E. Jalpaiguri district.

**Size:** 118 sq km.

**Forest Types:** Low alluvial savanna woodland and riverine deciduous forest (Champion and Seth 1968).

**Altitude:** 60 to 140 m.

**Dates of visits :** 18 May 1985, 6-7 May 1988, 1-2 June 1989.

**Grasslands surveyed:** Harindanga glades along Chirakhawa / Hollong river, Torsha Compartments 1, 2 & 3, Bengdaki, Kunjanagar, Sil Torsha, Malangi.

**Habitat:** Jaldapara is shaped like an inverted 'V' (Fig. 8). Earlier the west arm used to be drained by river Torsha, and the east arm by a much smaller river called Malangi. But now the main stream of Torsha flows through the east arm and Malangi has merged into it. Torsha is fast flowing, not very deep and has few grass covered islands.

The flood plains of the rivers and nalas are also grassy. However, all the grasslands are not suitable for the florican as most comprise of tall grass. The open glades between the tree forests appear suitable but many of these are too small for

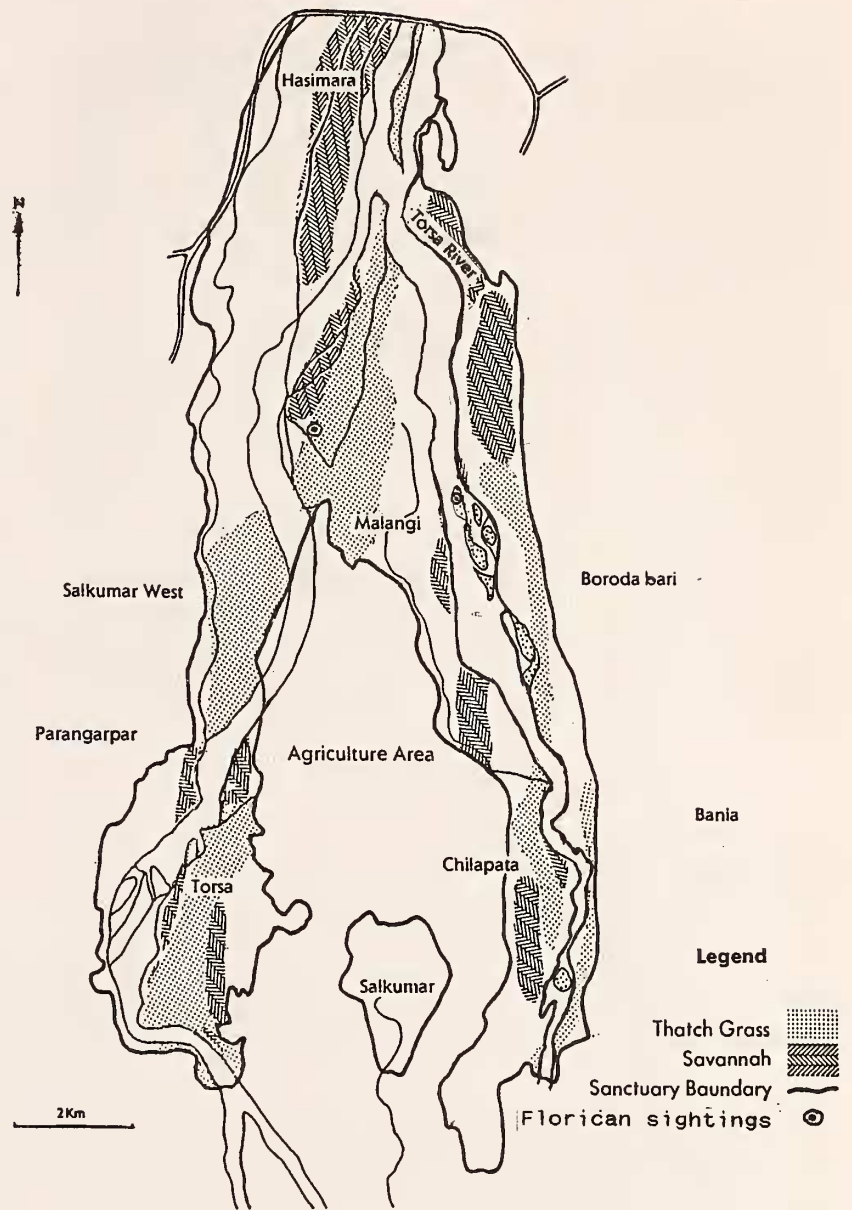


Fig. 8. Jaldapara Wildlife Sanctuary the bird.

**Results:** There are a few good grassland patches in the sanctuary, especially in Harindanga and Torsha Compartments 1 and 3. A few islands on the river Torsha also have good grass cover suitable for floricans.

We could not survey the sanctuary properly in 1985 and till then no confirmed report of florican sightings in Jaldapara was available. In 1988, we saw a male displaying in Harindanga area beside Chirakhawa nala near Hollong. Another cock florican was reported from Mourdanga. In Kunjanagar and Torsha East Camp, two males were seen in 1987 by Forest Department officials. On the evening of 6 May 1988, we surveyed Torsha Compartments and found a few small patches quite suitable for floricans,

though most of the grassland patches had been planted with *Dalbergia sissoo* (most of the trees were either young or stunted). A mahout of the Forest Department who regularly goes for patrolling told us that he saw a florican in that area a few months earlier.

In 1989, most of the short grass patches of the sanctuary were visited on 1 and 2 June. Although only 2 floricans were seen flying over an island in Torsha near Sil Torsha camp, reports of rare florican sightings were available from some other areas like in the previous year.

Cattle grazing and human disturbance are the major problems of the sanctuary's sparse florican habitats and according to our estimates Jaldapara may have not more than 10 floricans.

#### GORUMARA WILDLIFE SANCTUARY

*Location:* 26°46'N, 88°50' E.

*Date of visit:* 29 December 1985

*Grasslands surveyed:* The *chapories* of Murti river.

**Habitat:** Most of the area has very tall and dense elephant grass with a few patches of smaller grasses and shrubs.

**Results:** Short open grassland patches of suitable size were not seen during the survey. The sanctuary staff do not remember ever seeing floricans in Gorumara.

#### MARAKATA, NARATHALI AND DANGI

*Location:* 26°45' N, 89°45' E. In the buffer zone of Buxa Tiger Reserve under Rydak Range in Jalpaiguri district.

*Dates of visit:* 30–31 December 1985

**Habitat:** Originally there were grasslands along the river Rydak.

**Results:** The areas were devoid of suitable florican habitat and the few remaining patches of grasslands were highly degraded and disturbed. There was ample evidence of overgrazing by cattle. Trapping of wildlife was also noticed.

#### ATIAMACHAR AND BARO-BACHAMARI BEEL

*Location:* 26°25'N, 89°40' E. East-south east of Alipurduar in Cooch-Bihar district.

*Date of visit:* 1 January 1986

**Results:** No suitable habitat was found in the Baro-Bachomari Beel (a wetland) and the Atiamachar areas of Cooch-Bihar district. A patch of grassland in the midst of teak plantation at Atiamachar was heavily overgrazed.

#### SONAPUR

*Location:* 26°30'N, 89°20'E. About 20 km north-west of Cooch-Bihar town in Cooch-Bihar district.

*Date of visit:* 1 June 1989

**Results:** Some areas at Sonapur enclosed and protected for tree plantation by the state Forest Department had good growth of thatch grass. However, the plots were too small for floricans to occur there in spite of their presence in the adjacent areas of Jaldapara WLS.

#### BIHAR

Even in the past the Bengal florican was a fairly uncommon bird in Bihar (Hume and Marshall 1879, Baker 1921). In recent years it has not been seen in the state except for an unconfirmed record from Purnea which was the only district where the bird was not very rare earlier. Presently there are only two sanctuaries — Valmikinagar (462 sq. km) and Udaipur (9 sq. km) in the *terai-bhabar* tract of north Bihar. While Udaipur WLS is a wetland and not fit for florican, Valmikinagar may still have potential florican areas. Moreover, its proximity to Chitwan in Nepal where Inskipp and Inskipp (1983) have seen floricans makes Valmikinagar important for florican conservation. Both the potential florican areas in Bihar were surveyed by us (Fig. 9).

#### VALMIKINAGAR WILDLIFE SANCTUARY

*Location:* 27°25'N, 84°E. West Champaran district.

*Size:* 462 sq km.

*Forest types:* Semi-evergreen forest, moist deciduous forest, alluvial grasslands, riverine community and wetlands (Rodgers and Panwar 1988).

*Date of visit:* 11 May 1988

*Grasslands surveyed:* Madanpura Range, Kotaria nala, Naurangia.

**Habitat:** The forest of Valmikinagar WLS comes under the typical *terai*, with thick sal forest,

grasslands and swamps. During the last few decades, most of the grasslands have been converted into woodland by tree plantation.

There are two important forest ranges: Madanpura and Gunoli. In the Madanpura range, Compartments 1-3 have some so-called blank areas (grasslands) which have been planted with *Dalbergia sissoo*. About 60 ha of grassland was planted with trees as recently as March 1988. In Compartment 16, in the Kotaria nala some portions are suitable for floricans but being a depression, the nala gets waterlogged during the monsoon. Naurangia grassland near Naurangia nursery was earlier suitable for the floricans but now it has been converted into plantation.

**Results:** Floricans were not sighted in Valmikinagar WLS though we spent considerable time surveying all the approachable grasslands.

#### HARIABARA PROTECTED FOREST

**Location:** 26°15' N, 87°25' E. 50 km north of Purnea town and about 20 km south of the Nepal border in Purnea district.

**Habitat:** The 170 ha Hariabara PF falls under Araria sub-division and about 80 ha of it is under thatch grass.

**Results:** According to the DFO of Purnea, Arun Prasad, a male floricane was seen by him and the Conservator of Forests in May 1987 among thatch grass of Hariabara field no. 3. We could not see any floricans during our visit on 9 May 1988 but a forest guard claimed to have seen one bird just ten days before our visit. Although the habitat appeared too degraded for a shy bird like the floricane, it is possible for a few individuals to stray here as the place is only about 60 km from Kosi Barrage area in Nepal where Inskipp and Inskipp (1985) had seen the bird.

#### UTTAR PRADESH

The whole of north Uttar Pradesh from Haldwani to Gorakhpur was once floricane country but now the tract is more or less under human occupation. At present, we can be sure of only two places — Dudwa National Park and Kishanpur Wildlife Sanctuary — where the floricane is present, but there are three

more areas — Lagga Bagga, Katarniaghat and Sohagi Barwa — where there are good chances of this bird being present. We did a thorough survey of the U.P. *terai* from Pilibhit to Gorakhpur and visited the following areas (Fig. 9).

#### DUDWA NATIONAL PARK

**District:** Lakhimpur Kheri

**Coordinates:** 28° 24' to 28° 40' N, 80° 34' to 80° 49' E

**Size:** 614 sq km.

**Forest type:** Moist deciduous forests, alluvial grasslands

**Area under grassland:** About 25%

**Study period:** 17 -21 April 1985, 30 April - 6 June 1987, 22 Jan. - 22 June 1988 and 16 Feb. - 10 July 1989.

**Grasslands surveyed:** Satiana, Madraiya, Phulvaria, Sonaripur, Seetha Gadhaia, Bhadi, Louki, Salukapur etc. (Fig. 10).

**Habitat:** The Park has two main rivers, the Mohana and Suheli, which form natural boundaries to the north and south respectively. The Park's water system drains into these two rivers which are tributaries of the Sharda, which in turn is a part of the Ganga river system.

The forests are moist deciduous, being dominated by sal *Shorea robusta*. The forests are interspersed with tracts of low lying grasslands which tend to get flooded during the monsoon. The grasslands had khair *Acacia catechu* as the dominant woody species which by 1905, had mostly been worked out to meet timber needs (District Gazetteer 1905). In the 1950s, under plantation schemes, tracts of grasslands were planted with sheeshum *Dalbergia sissoo*, simul *Bombax ceiba* and *Eucalyptus*. These plantations have mostly been unsuccessful, leaving behind scattered clusters of trees of varying densities. The grasslands (including open forests) occupy about 120 sq. km of the Park.

**Results:** The present study reveals that the Bengal floricane is found in larger numbers than was earlier supposed. A population of at least 40 floricans in the Park is estimated. 19 males were seen, 14 territories (display sites) were located, two immature males were sighted and three adult males were seen, whose territories could not be identified.



Fig. 9. Survey sites in Uttar Pradesh and Bihar. 1. Lagga-Bagga, 2. Mahauf Range, 3. Kishanpur WLS, 4. Dudwa, 5. Katerniaghat WLS, 6. Suhelwa, 7. North Gonda Forest, 8. Sohagi-Barwa, 9. Valmikinagar WLS, 10. Hariabara PF.

The Bengal florican has been recorded from all the five ranges that comprise the Park. This study has located floricans in four ranges: Dudwa, Bankatti, North Sonaripur and South Sonaripur (Fig. 10). The Bellraein range needs more investigation.

We have identified three main florican areas in the Park: (1) Around the Satiana FRH on the border of Dudwa and Bankatti ranges, (2) in the rhino enclosure at Salukapur in the South Sonaripur range, and (3) around the Sonaripur FRH on the border of North and South Sonaripur ranges. Details of locations of the territories, and other sightings are given in Table 3. Grasslands that seemed suitable for the florican and requiring further investigation are given in Table 4.

#### SOHAGI BARWA WILDLIFE SANCTUARY

*Location:* 27°10' to 27° 20' N, 83°35' to 83° 50' E. Gorakhpur and Deoria districts

*Size:* 428 sq km.

*Forest Types:* Eastern heavy alluvial plains, moist mixed deciduous forest

*Dates of visits :* April 1985, 15-16 May 1988.

*Grasslands surveyed :* Nagwa and Sunari.

**Habitat:** The forest of Sohagi Barwa is broken up into various patches. Most of the original grasslands have come under the plough or are heavily overgrazed. Some suitable grasslands are still present inside the larger blocks of forests, several of which have been planted. Generally the plantations are unsuccessful due to waterlogging, but the practice continues as a regular forestry

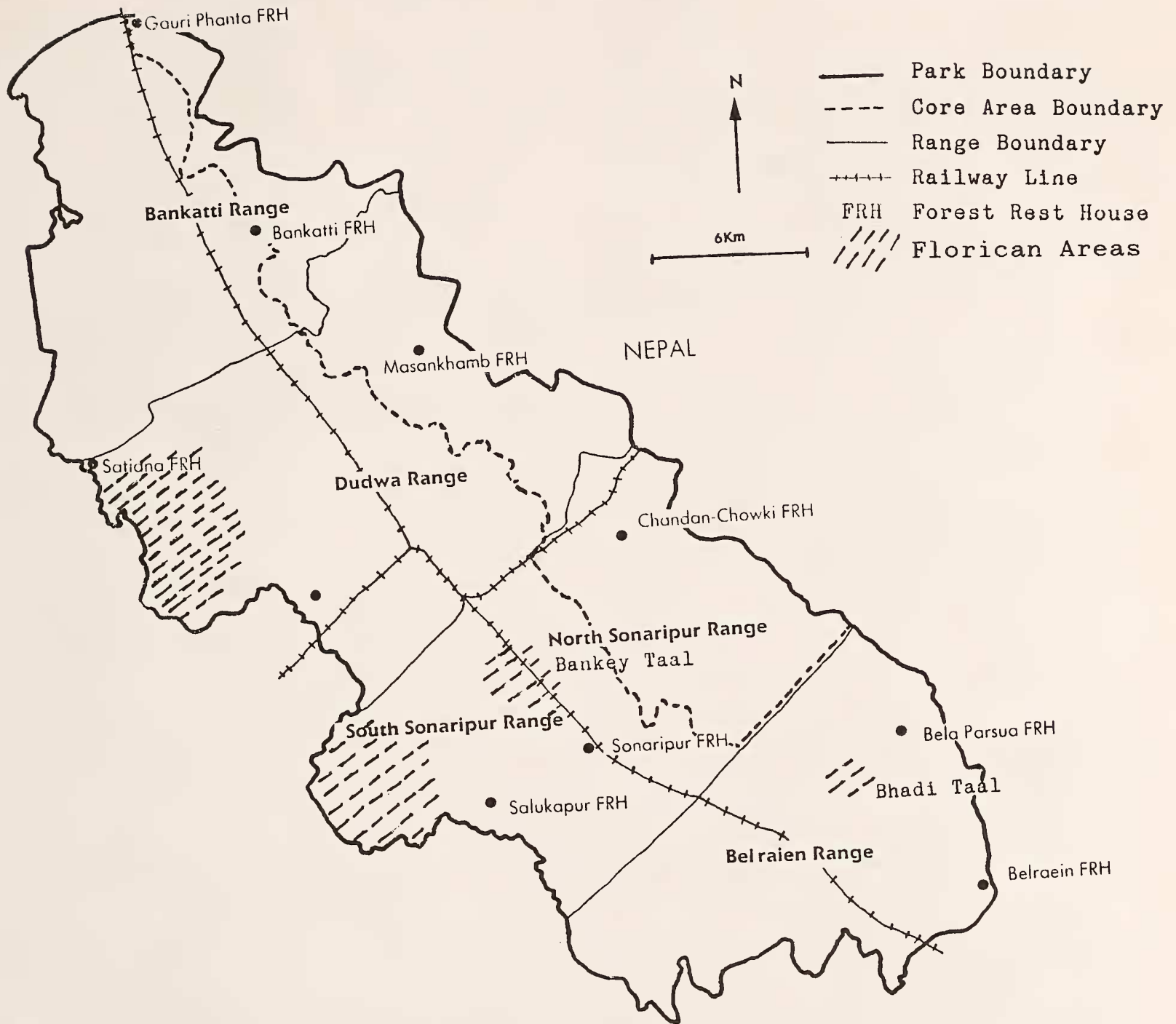


Fig. 10. Dudwa National Park

operation. Sohagi Barwa was declared as a wildlife sanctuary in June 1987.

**Results:** North Gorakhpur forests, mainly Nichloul and Sohagi Barwa, were visited during our survey in 1985. We could not see any floricans either then or in 1988 when we spent two days in Matholia range of the sanctuary. However, we suspect that the florican may be present in this region as some grasslands in Nagwa and Sunari blocks have good florican habitat. Compartment 16 of Nagwa and Compartment 31 of Sunari adjoin each other and constitute a compact

grassland of 262.3 ha. Though half the grassland is already planted with *Dalbergia*, *Syzygium* and *Artemisia*, some parts as recently as 1987, the remaining area has perfect grass cover for floricans. Even the new plantations are good for floricans as they are better protected to save the saplings from livestock.

There is an urgent need to save the natural grasslands of Sohagi Barwa WLS, which are the prime candidates for reintroduction or recolonization by the Bengal florican. Sohagi Barwa is connected with Valmikinagar WLS in

TABLE 3  
LOCATION OF MALE BENGAL FLORICANS IN DUDWA NATIONAL PARK

Range	Region	Location of males	No. of territorial males	Other males	Dates of sighting	Remarks
Dudwa	Satiana FRH	c. 400 m west of Kowhagatti bridge on southern side of road	1	—	Feb.-June 1988	—
"	"	In Chapra phanta on southern side of road	1	—	"	—
"	"	In Madraiya near 'pukka' machan	—	One adult	30 April 1988	Seen in flight
"	Sarota Beat	Phulvaria phanta; southern side of Dudwa Masankhamb forest road	1	—	Feb.-June 1988	—
Bankatti	Satiana FRH	Navalkhad phanta	2	One	Feb-June 1988	Imm. male seen on 27 Feb. '88
Sonaripur (North)	Sonaripur FRH	Seetha Gaddaia phanta on Rd. no. 64 between FRH and Dudwa-Chandan Chowki metalled road	2	One	25 May 1988	All 3 males seen simultaneously
Sonaripur (South)	Sonaripur FRH	In grassland just west of FRH between FRH and railway station	2	—	"	—
"	"	Bankey taal	—	One adult	26 May 1988	Near Rly. track
"	"	Bankey taal	—	One imm.	16 June 1988	Savarkar (pers. comm.)
"	"	In grassland east of FRH on Rd. no. 64 going to Salukapur	1	—	26 May 1988	—
"	Salukapur Rhino Enclosure	Chetwa phanta adjacent to FRH Kakraha road	1	—	Mar.-June 1988 (periodically)	—
"	"	Kurmania phanta	1	—	"	—
"	"	Parbhatia machan phanta	1	—	5 & 6 May 1988	—
"	"	Bela phanta	1	—	6 May 1988	—

TABLE 4  
DUDWA GRASSLANDS REQUIRING FURTHER INVESTIGATION

Range	Grassland	If present in the past	Information given by	If seen recently	Visited by us or not
Bankatti	Dankhera	Yes	Amar Singh	No	Yes
Sonaripur (North)	Lohti	Yes	Tharus	?	Yes
Sonaripur (South)	Louki	?	—	Yes females	Yes
Bellraien	Sathanatha	Yes	Tharus	?	Yes
"	Kusumba Chowki	Yes	Balram Singh	No	Yes
"	Bhadi Taal	Yes	Ashok Singh	No	Yes
"	Churela Taal	?	—	No	Yes

Bihar and is close to Chitwan in Nepal where the Bengal florican is present.

#### SUHELWA WILDLIFE SANCTUARY (Proposed)

*Location:* 27°40' N, 82°14' E. Bahraich and Gonda districts.

*Size:* 450 sq. km.

*Forest Types:* Terai and bhabar sal forest and wetlands.

*Date of visits:* 17 May 1988

*Grassland surveyed:* Ghabapur chapa.

**Habitat:** It is a typical terai forest dominated by *Shorea robusta* in drier areas. *Saccharum*, *Themeda*, *Imperata* and *Vetiveria* are the common dominant grasses in the open areas where the trees of *Bombax ceiba*, *Acacia catechu* and *Terminalia tomentosa* are also found.

**Results:** We visited a small grassland, the Ghabapur chapa, in Katkunya beat of west Suhelwa. The main grass, *Vetiveria*, is auctioned by the Forest Department. Since 1980, *Acacia catechu* has been planted in the grassland which, though mainly unsuccessful, has destroyed the natural characteristics of the grassland, possibly resulting in the disappearance of the florican.

Once the forests are declared as a sanctuary and all the natural features of Suhelwa are protected, there are chances that the florican may appear in some of the grasslands.

#### NORTH GONDA FOREST

*Location:* 27°45' N, 82° 45' E (approx.). Gonda district.

*Forest Types:* Typical terai forest.

*Date of visit:* 16 May 1988.

*Grasslands surveyed:* Beerpur and Bhagwanpur Beats.

**Habitat:** The typical sal forest of the terai is seen in North Gonda. According to the local DFO, most of the grasslands have been planted. Beerpur Beat has a dam reservoir.

**Results:** 1. *Beerpur Beat, Bhabar Range:* Grasslands in this area are all under heavy grazing pressure. The grass and grazing rights are auctioned by the Irrigation Department annually. Grass grows in the dry areas of the reservoir but is soon grazed by the village cattle. There was one small patch of grassland of about 10 ha abutting the forest but there is practically no chance of floricans living in such a disturbed area.

2. *Plantation in Bhagwanpur Beat:* This elongated 40 ha grassland has been planted over in 1985 and 1987. Owing to protection from grazing (to protect the saplings), good grass cover was present in the 1985 plantation. Survival of trees was nearly 75% but most saplings were stunted, thus giving the appearance of a savanna. The small area is disturbed by movement of villagers on the nearby forest road. The florican is unlikely to have survived in the face of so many detrimental factors.

#### KATERNIAGHAT WILDLIFE SANCTUARY

*Location:* 28°15' N, 81° 16' E. Bahraich district.

*Size:* 400 sq km

*Forest type:* Typical terai forest of semi-evergreen, moist deciduous, alluvial grassland, wetlands and riverine community.

*Dates of visits:* 26-27 April 1985, 9-12 April & 18-19 May 1988.

*Grasslands surveyed:* Around Katerniaghat Forest Rest House.

**Habitat:** Katerniaghat was declared a wildlife sanctuary in 1976 for the specific purpose of protecting the wildlife of the area, which was threatened due to the irrigation projects on the Ghagra river and the resultant human disturbance. The sanctuary is located nearly 30 km east of Dudwa NP near the Indo-Nepal border.

Large open patches of grasslands are present around the Katerniaghat Forest Rest House, and on both sides of the Katerniaghat-Girija bund road. Overgrazing by livestock is one of the major disturbances to the grasslands here. Moreover, a huge area near Katerniaghat FRH is now occupied by a Government Seed Farm.

**Results:** Though Katerniaghat was surveyed both in 1985 and in 1988 floricans were not located in spite of some of the remaining habitat being apparently suitable for these birds. If grazing is banned during the breeding season (February to June), the bird might appear here. Its proximity to Dudwa and Royal Bardia (Nepal) makes it suitable for recolonization by the florican. Floricans were seen in Katerniaghat a decade ago and some of them might still be present or visiting in certain months.

## KISHANPUR WILDLIFE SANCTUARY

*Location:* 28°27' N, 80° 22' E. Lakhimpur Kheri district.

*Altitude :* Around 200 m

*Size:* 227 sq km.

*Forest Type:* Semi *terai* forest with extensive sal forest, grasslands near river beds and wetlands.

*Dates of visits :* 21-22 April 1985, 24-25 May and 29-30 May 1988.

*Grassland area surveyed* East Kishanpur, Jhadi Tal, North Kishanpur, Puayan, Madha Block (Mailani) and Dhanha chander.

**Habitat:** Kishanpur was declared a Wildlife Sanctuary in 1973 and came under Project Tiger in 1988. Open grasslands (*chander*) are present throughout Kishanpur WLS although many have been converted into woodlots by tree plantations. Most of the grasslands are in the depressions representing the abandoned beds of old rivers (probably of the Sharda).

**Results:** As Kishanpur WLS is close to Dudwa and has potential florican grasslands, almost all important grasslands were surveyed. Though floricans were not seen, it is likely that they are present in some areas. On 25 April 1990, a Bengal florican was seen in flight in crop fields adjacent to the Kuthar diversion in South Kheri Forest Division (S. P. Sinha, pers. comm.). This area is contiguous with the sanctuary. It is possible that this individual came from the sanctuary. The following areas have good potential:

1. *East Kishanpur, Compartment 2A :* About 1 km from the Kishanpur FRH, there is a 30 ha grassland which was planted a few years ago but none of the saplings survived. Presently it is under grass cover and the height of grass growing in clumps was between 70 and 90 cm.

2. *Jhadi Taal :* About 4 km from Kishanpur FRH is the main swamp deer area called Jhadi Taal. It is a depression about 2 km long and 1 km wide. Owing to the drought in 1987 Jhadi Taal had dried up, resulting in growth of grass, and we saw 83 swamp deer *Cervus duvaucelli duvaucelli*.

3. *East Kishanpur, Compartment 2B:* A 30 ha grassland plot adjoining Jhadi Tal was planted with *Eucalyptus*, *Tectona* and *Dalbergia* in 1987 and protection from cattle and fire has resulted in a dense growth of grass. Near this plot is a 16 ha Gram Samaj land of the abandoned Raikhera village and about 2 km away is Kishanpur village (population 1500, livestock 400-500), so the area is not undisturbed.

4. *North Kishanpur, Compartment 3B and Puayan grassland:* North Kishanpur Comp. 3B is small (17 ha) and in 1987 the grassland was planted over by *Eucalyptus* and *Dalbergia* so the habitat is no longer suitable for florican. Near Comp. 3B, on the other side of the forest road is a larger 100 ha grassland (under Puayan range) which appears to be suitable for florican; unfortunately, this grassland is also being altered by massive tree plantation. Nearly 100,000 trees were to be planted during the monsoon of 1988. A part of the Puayan grassland is on the bed of Ull river, and is covered with tall, very dense tall thatch grass. Slightly higher areas, under short grass, were more suitable for florican. These areas have been marked for afforestation.

5. *North Kishanpur, Compartment 1 :* There is a small 45 ha grassland adjoining to which is a small human settlement and forest. This plot was also planted in 1987 with *Azadirachta indica*, *Tectona grandis*, *Dalbergia sissoo* and *Terminalia tomentosa*.

6. *Dhanha grassland:* 5 km from Mailani on Bhira road there is another excellent grassland known as Dhanha *chander*. It is nearly 4 km long and 800-1000 m wide but four of us walking through it could not flush any florican.

7. *Madha Block (Mailani Range):* One of the best and most promising grasslands for floricans in Mailani range is in the Madha Block. It is about 143 ha and extends on both sides of the Singhghoru road. During our visit on 29 May 1988 when five people searched for the floricans the grass height was 50-70 cm. Being inside the forest the grassland is undisturbed. Near Madha grassland on Madha-Burgad Chowki road there is another grassland which is suitable for floricans<sup>1</sup>.

<sup>1</sup>Three male Bengal floricans were spotted in Kishanpur WLS on 2 and 3 May 1991. The first, a territorial male, was seen on Madha grassland when it made a display leap. The other two were located on a grassland near Bugad-Chowki.



## PILIBHIT DISTRICT

Some of the best *terai* forests of Uttar Pradesh can be seen in Pilibhit district, and especially in Mahauf and Mustafabad ranges. North Pilibhit consists of nearly 550 sq. km and South Pilibhit 400 sq. km of sal and mixed forests. About 100 sq. km of the North Pilibhit forest was grassland which has since 1962 been converted into plantations. Due to the failure of *Eucalyptus* plantations done between 1962 and 1980, the Forest Department is now planting teak. In the protected plantation blocks where *Eucalyptus* had failed, natural growth of sal is coming up.

Grasslands in this area too are called *chander*. As all the grasslands have been planted, teak plantation is now being done under the existing trees in the degraded forests.

## MAHAUF RANGE (North Pilibhit)

*Location:* 28° 35' N, 80° 10' E (approx.)

*Forest Types:* Typical sal dominated *terai* forest, with grasslands and wetlands.

*Date of visit:* 25 May 1988.

*Grasslands surveyed:* Compartment Nos. 13 and 106.

**Results:** We visited the following two areas which have some semblance of the former grasslands:

1. *Compartment No. 13:* This grassland of about 300 ha was extensively planted with *Eucalyptus* which has failed. The forestry operations have destroyed the natural features, but if the trees are removed, the area can again become a grassland. Coppicing of *Eucalyptus* was done only once and two more coppicing will be done. After the third coppicing *Eucalyptus* will be dug out and the area will be left fallow for few years and then planted again. It will be interesting to see if floricans will return to this grassland during this intervening period.

2. *Compartment No. 106:* The original grassland patch in this compartment consisted of about 480 ha. Like Compartment No. 13, *Eucalyptus* plantations were done in 1970-71 but were unsuccessful. However, *Eucalyptus* plantations done in the early 1980s were more successful and totally altered a good florican area.

## LAGGA-BAGGA (Mustafabad Range)

*Location:* 28° 46' N, 80° 09' E

*Size:* 11 sq. km.

*Forest Type:* Sal and mixed forest, alluvial grasslands and wetlands.

*Dates of visits:* 26-27 May 1988

*Grassland area surveyed:* Naryaliya and Lagga-Bagga Beats.

**Habitat:** Lagga-Bagga is located on the Indo-Nepal border adjoining Sukla Phanta Wildlife Sanctuary of Nepal in the north-east. In the south and south-east the Sharda river forms a loop around it. The forest and grasslands of Lagga-Bagga form a continuous stretch with Sukla Phanta.

Nepali graziers freely enter Lagga-Bagga to hunt, fish and graze their cattle. Moreover, Bengali settlers on the Indian side also use this tiny belt of forest for fuel and fodder needs. We were told that the authorities of Sukla Phanta are very strict, and so the habitat and wildlife is well protected on their side.

**Results:** In spite of a two day search we could not locate any florican in Lagga-Bagga although we are almost certain that it is present, mainly because it was seen in the contiguous grasslands of Sukla Phanta by Inskipp and Inskipp (1983, 1985). Due to inaccessibility, we could not reach Lagga-Bagga during the display time of the florican (i.e. early morning and late evening), ideal for locating territorial males. Of the three main *chandars* the first is not very suitable for floricans as the grass was too tall (150 to 200 cm) and dense. The second grassland is excellent for floricans with short thatch grass of less than 100 cm in the middle (on the ridge) surrounded by taller grass on the stream beds, followed by thick forest. The third compartment adjoins the vast grassland of Sukla Phanta and is the most suitable for floricans.

## STATUS OF THE BENGAL FLORICAN

While it is difficult to accurately estimate the number of Bengal floricans surviving in India, it is certain that there are more birds than estimated earlier. For instance, Deb Roy (1985, pers. comm.) estimated that 34 birds

were present in Manas. However, we estimate that there are not less than 80 floricans in Manas. Similarly, we estimated that less than 20 floricans survived in the whole of Uttar Pradesh. Subsequent to intensive studies at Dudwa, we found that at least 35 to 40 were present. Inskipp and Inskipp (1983,1985) saw 35 to 50 floricans in Nepal and they estimated a total population of 100 birds in that country. We believe that there are between 250 to 300 Bengal floricans in India, which brings this bird to a precarious world population of about 400.

#### RECOMMENDATIONS

The loss of habitat seems to be the main threat to the Bengal florican. As more and more grasslands are acquired for cultivation either legally or by encroachment, the shrinking habitat brings the florican in direct conflict with man. Unlike the other two bustards breeding in India the Bengal florican stays away from cultivation and even if it does nest rarely in the village thatch fields or certain crop fields, the chances of destruction of the eggs during weeding or harvesting are always high. Overgrazing and late burning of the grasslands are the major danger to the florican habitat, though these are well under control in sanctuaries like Dudwa, Manas and Orang. In some of the reserve forests e.g. North Pilibhit and North Gorakhpur, the 'blank' areas (natural grasslands) have been afforested and are no longer suitable for the florican. Nevertheless, there are still some grasslands which if managed and protected properly, could be re-colonized by the Bengal florican. Some of these grasslands are near areas where the florican is still present. We recommend that such grasslands should be managed for the conservation of the florican and tree plantation should be strictly avoided. Specific recommendations for each area visited by us are given elsewhere (Rahmani *et al.* 1988). The following are some of the general recommendations:

Protection of natural grasslands in the whole terai belt and the Assam valley with special emphasis on the Brahmaputra islands and flood plains. Proper maintenance of open grassland by timely burning and/or harvesting.

Ban on tree plantation in suitable grasslands. Restoration of the presently degraded grasslands and strict control on grazing and untimely burning/harvesting.

Introduction of large scale thatch cultivation at least in areas not suitable for paddy.

Protection against shooting and trapping. Generating awareness among people regarding the florican's extremely endangered status.

Regular monitoring of florican populations in all major habitats by Forest Department staff and maintenance of sighting records.

#### ACKNOWLEDGEMENTS

This study was undertaken as a part of the Bombay Natural History Society's Endangered Birds Project financed by the U.S. Fish and Wildlife Service and sponsored by the Ministry of Environment, Forest and Wildlife, Government of India. We are indebted to Dr. Salim Ali and Mr. J.C. Daniel for inspiration and encouragement during their tenures as the Principal Investigators of the Project. Geldon Bhutia, Parikshit Gautam, Qamar Qureshi, Manideep Raj, Prasanta Saikia and Srikanta Sarma provided companionship and invaluable help during different stages of the survey. Various other people who helped us across the four states are too numerous to name here. We thank all of them. The forest departments of Assam and Uttar Pradesh granted us permission to work and provided necessary assistance. We are grateful to them.

#### ADDENDUM

##### ARUNACHAL PRADESH

At least till the first quarter of the present century the Bengal floricans were recorded in fair numbers from Sadiya plains including areas along the southern boundaries of Siang and Dibang districts of Arunachal Pradesh bordering Lakhimpur district of Assam. According to Colonel Graham the floricans were found in small numbers right upto the foot of Abor, Mishmi and Dafla Hills east and north of Sadiya (Hume and Marshall, 1879). (Sadiya town: 27° 50' N, 95° 42' E). Baker (1921) has mentioned the grasslands and 'churs' bordering Dihang, Dibang and Brahmaputra rivers upto the

foothills as the eastern most limit for the bird. Due to technical reasons we could not survey these areas.

Pandya (pers. comm.) carried out a survey of the grasslands of D'Ering Memorial (Lali) Wildlife Sanctuary (27°55' N, 95°25' E) in East Siang district. He counted 12 Bengal florican

males between 11 and 25 April 1990. It is possible that there are 20 to 25 floricans in this sanctuary which is located on the islands of Dihang (Siang) river north of area where Dibang (Sikang), Sesar and Lohit rivers join it to form Brahmaputra. Dibru-Saikhowa Wildlife Sanctuary of Assam is located just south of this point.

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